FENCE INTRUDER DETECTION SYSTEM (FIDS)

MOHD AZWAN BIN ADNAN

This report is submitted in partial fulfillment of the requirements for the award of Bachelor of Electronic Engineering (Telecommunication Electronics) With Honours

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

May 2008

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : FENCE INTRUDER DETECTION SYSTEM (FIDS)

Sesi Pengajian : 2004/2008

Saya MOHD AZWAN BIN ADNAN
(HURUF BESAR)

mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (√) :

☐	**SULIT***	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD***	(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☒	**TIDAK TERHAD**	

(TANDATANGAN PENULIS)

Alamat Tetap: 45, Jalan SG 6/14 Taman Seri Gombak,

68100 Batu Caves, Selangor.

Tarikh: 16/5/08

Disahkan oleh:

(COP DAN TANDATANGAN PENYELIA)
IMRAN BIN MOHD IBRAHIM
Pensyarah
Fakulti Kej. Elektronik dan Kej. Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 16/5/08

"I hereby declare that this report is the result of my own work except for quotes as cited in the references."

Signature : .....

Author : MOHD AZWAN BIN ADNAN

Date : 16/5/08

"I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the scope and quality for the award of Bachelor of Electronic Engineering (Telecommunication Electronics) With Honours."

Signature : .....

Supervisor's Name : MR. IMRAN BIN MOHD IBRAHIM

Date : 16/5/08

Special thanks for my loving family, supervisor and friends

ACKNOWLEDGEMENT

First and foremost, I would like to express my heartily gratitude to my supervisor, **Mr. Imran Bin Mohd Ibrahim** for the guidance and enthusiasm given throughout the progress of this project. My appreciation also goes to my loving mother and father, **Mrs. Pauziah Bt. Said** and **Mr. Adnan Bin Shaari** also my family who has been so tolerant and supports me all these years. Thanks for their encouragement, love and emotional supports that they had given to me. I would also like to thank to my devoted friends for their co-operations, guidance and helps in this project. Nevertheless, my great appreciation dedicated to my member's batch 4BENT and those whom involve directly or indirectly with this project. There is no such meaningful word than. Thank you so much and assalamualaikum.

ABSTRAK

Projek Sistem Keselamatan Pengesan Kawasan Berpagar (Perimeter) ini mengaplikasikan kegunaan alat pengesan, camera, pengawal mikro dan alat kawalan grafik. Objektif projek ini adalah untuk menghasilkan Sistem Keselamatan Pengesan Kawasan Berpagar (Perimeter) yang ringkas dan mempunyai pelbagai fungsi. Alat pengesan yang digunakan untuk projek ini boleh di sesuaikan dengan pelbagai jenis pengesan mengikut kesesuaian penggunaan. Antara pengesan yang boleh digunakan adalah seperti pengesan getaran dan pengesan pegerakan. Sistem ini menggunakan IC MAX 232 sebagai penggantaramuka. Panel kawalan yang terdapat di komputer digunakan untuk memaparkan situasi di kawasan perimeter di mana ia dapat menunjukkan video secara langsung dan sistem penggera keselamatan. Pengguna juga dapat mengetahui kawasan perimeter yang dipaparkan jika ada pencerobohan. Jika ada pencerobohan, sistem ini akan akan mengeluarkan amaran dengan membunyikan tanda amaran pada panel kawalan serta loceng isyarat yang terdapat pada litar dan kamera akan menangkap gambar situasi pencerobohan berlaku.

ABSTRACT

The project of a Fence Intruder Detection System (FIDS) contents the function of sensors, the application of a micro-controller (Peripheral Interface Controller) and Graphical User Interface (GUI) as control panel. The objectives for this project are to design a simple and multi-function Fence Intruder Detection System (FIDS) which use sensors like vibration sensor and motion sensor and IC MAX 232 application to transmit data from hardware to personal computer (PC). This Fence Intruder Detection System (FIDS) applying an IC MAX 232 communication as a medium transmission and used the GUI on the PC as a control panel. A control panel on PC is used as a key to monitor the system by displays the behaviour of perimeter. Users also will found that they can know if the perimeter detects intruder by GUI. A warning alarm through both the control panel and hardware part will occur as the perimeters have been alert intruder.

TABLE OF CONTENTS

II LITERATURE REVIEW

III PROJECT METHODOLOGY

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX

LIST OF ABBREVIATIONS

FIDS	-	FENCE INTRUDER DETECTION SYSTEM
SFR	-	SPECIAL FUNCTION REGISTER
RAC	-	ROLE-BASED ACCESS CONTROL
PIC	-	PERIPHERAL INTERFACE CONTROLLER
RAM	-	RANDOM ACCESS MEMORY
ROM	-	READ-ONLY MEMORY
PROM	-	PROGRAMMABLE READ-ONLY MEMORY
EPROM	-	ERASABLE PROGRAMABLE READ-ONLY MEMORY
IC	-	INTEGRATED CIRCUIT
PCB	-	PRINTED CIRCUIT BOARD
DB	-	DECIBELS
DSC	-	DIGITAL SIGNAL CONTROLLER
OOP	-	OBJECT-ORIENTED PROGRAMMING

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

Nowadays, we know that they have been reported about crime over premise where people always ignore safety for their premise. We should know that the security important for our premise. The highest percentage of crimes is made by thefts and burglaries. Such situation has influenced the development of object security systems as well. At peak hours, however, when many enterprises practically at the same time disarm their security systems in the morning and arm them in the evening after work, this probability grows up considerably [1]. Formerly popular autonomic security systems are currently replaced by more effective integrated security systems [2]. Demands for affordable multipurpose security system [3] for home, premise on other usage have been on the rise. In the past literature, many expert research multi-agent principles [4, 5], and apply the technology in many fields. Yamazaki built a security system using Role-Based Access Control (RAC) for smart-office environment [6]. Fence Intruder Detection System (FIDS) is designed to detect the illegal intruders and to warn the premise owner. When premise owners were sleeping or left the premise, they can start the security system to monitor their premise and trigger the alarm if there were illegal intruders. People can save much money because they do not need to employ a security guard. Instead, they can just install a security system [7].

1.2 OBJECTIVE

The main objective for this project is to design system that calls Fence Intruder Detection System (FIDS). IC MAX 232 application is make use to transfer the data which collect from the sensor through the Peripheral Interface Controller microcontroller (PIC micro-controller) before transmit data to PC.

This project also will apply the function of PIC micro-controller as the most important part for hardware circuit. The PIC micro-controller is programmed to collect the data as it received request form the control panel. It also converts an analogue output signal from the sensors into digital signal before the data transmit to the control panel on PC.

Other objective is improving knowledge in design, fabrication, develop language like assembly language (asm) and other using Multisim, PROTEL, Proteus, MPLAB IDE, Visual Basic and MATLAB.

Designing the Graphical User Interface (GUI) is the other objective as their user interface and control panel. The designing are using from Visual Basic or other software for create the software.

Fence Intruder Detection System (FIDS) is design with a low cost as it tries to be a simple system with multiple functions. A minimize components and economical components must be use to achieve this objective. The system must be designing to meet the requirement of security system standardization

1.3 PROBLEM STATEMENT

This system used GUI, camera and sensor for surveillance monitoring. By using these devices, user will find more convenience to handle the system. User also doesn't need to monitor 24 hours if there is situation needed compare to the old convention security such as hire a security guard, the PC (control panel GUI) can still monitor the parameter as long as the camera and sensor can detect intruder and any movement of surrounding area in a real time. Moreover, this intelligence system can save both time and money such reducing labour cost. Due from this factor, this system will brings even more benefits such as it is simple to collect data from each sensors.

As the system has been design, this can avoid any crime in any premise that installs this system. Moreover, it can reduce crime for time being. These systems also build for real time monitoring service for perimeter where conventional system always ignore the 24 hours protection. As the real time monitoring has been design, it can eliminate any intruder at any time and situation.

As the security system has been designs in grown technologies, many other systems ignore the important of the false alarm. People working in the alarm industry will generally agree that the number one cause of sleepless nights and premature hair loss is the evil and dreaded false alarm. A false alarm can be defined as an alarm condition that resulted from something other than a break-in, fire or an actual emergency situation [8]. For this project, it designs to reduce the number of false alarm.

Others are to ensure the quality and reliability of intruder alarm systems. This is to make sure that this system works at any situation and eliminate any problem that can make unsuccessfully interrupt protection.

This project likely will be done for a low cost and simple installation system as most of the products in the market are expensive and unfriendly with user. With a low cost of making this project, users will have more option to buy this kind of system.

1.4 SCOPE OF WORK

The scope for this project is divided into two parts which a hardware and software part. For the first part, hardware part will consists of designing a circuit which consists of sensors; like photobeam sensor, vibration sensor and motion sensor, PIC micro-controller and also RS232 serial port circuit for capable to transmit the communication through it for Graphical User Interface (GUI). The PIC micro-controller will be programmed to integrate with software part as to make sure that the connection between both parts is available. Then, the hardware is fabricated.

As for software part, it will include the development of a programming graphical user interface (GUI) for control panel and programming for PIC micro-controller. Both programming will control the connection between the control panel on PC and the hardware part via RS232 serial port which located at each part. Visual Basic Window is used for development of programming for the GUI meanwhile assembly language programming is needed to creating the source code for PIC microcontroller.

1.5 METHODOLOGY

The method that was used for Fence Intruder Detection System (FIDS) project is design the PIC circuit and communication circuit using Proteus. The circuit must have connection sensors and siren. Develop the coding to integrate between them through Peripheral Interface Controller (PIC). The PIC that be used is PIC 16F648A. The programming is MPLAB IDE that burned into PIC by PIC burner or programmer using assembly language (asm file).

1.6 REPORT STRUCTURE

Chapter One briefs the introduction of the Fence Intruder Detection System (FIDS) project. It also consist the objectives of the project to design the basic and economic security system.

In literature review chapter Two, it wills discuses general knowledge about security system and component literature review. To explain the perspective and method that used in previous research and also explained the relation between research information and the theory. This chapter also described the theory and method used to solve the project.

Chapter Three will explain the methodology uses to the data collection method, data process method, analyze the data, block diagram, flow chart. The chapter also describes detail the block diagram and the flow chart of every part component uses to construct the circuit and also the design of the circuit.

Chapter Four shows the result and discussion to all an initial result, finding and analyses during the research. To show how far the hypothesis could be realization.

For the last chapter Five, it covered the entire conclusion, finding project analyze the project progress, suggestion or opinion and also further research in future.

CHAPTER II

LITERATURE REVIEW

2.1 BACKGROUND OF STUDY

In this section, the learning about Peripheral Interface Controller (PIC), microcontroller, serial transmission, sensors, and about developing security system came about are discussed. All about literature review had been covered in this chapter.

2.1.1 Peripheral Interface Controller (PIC)

PIC (Peripheral Interface Controller) is the IC which was developed to control peripheral devices, alleviating the load from the main CPU. Compared to a human being, the brain is the main CPU and the PIC is equivalent to the autonomic nervous system.

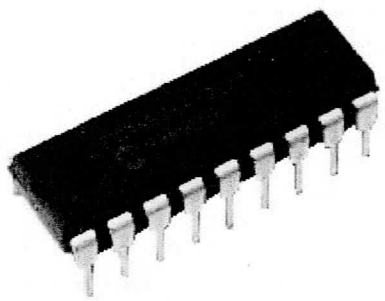

Figure 2.0: Peripheral Interface Controller (PIC)

The PIC, like the Central Processor Unit (CPU), has calculation functions and memory, and is controlled by the software. However, the throughput and the memory capacity are low. Depending on the kind of PIC, the maximum clock operating frequency is about 20 MHz and the memory capacity (to write the program) is about 1K to 4K words. The clock frequency determines the speed at which a program is read and an instruction is executed. The throughput cannot be judged with the clock frequency alone. It changes with the processor architecture. However within the same architecture, the one with the highest clock frequency has the highest throughput. An instruction is a word long. Program memory is measured in BYTES, one byte is 8 bits. The bit is the smallest unit, and can have the value of 1 or 0. The instruction word of the PIC16F84A is composed of 14 bits. 1K words is equal to 1 x 1,024 x 14 = 14,336 bits. To convert this to bytes divide it by 8 x 1024, (14,336 / 8 x 1024=1.75Kbytes).

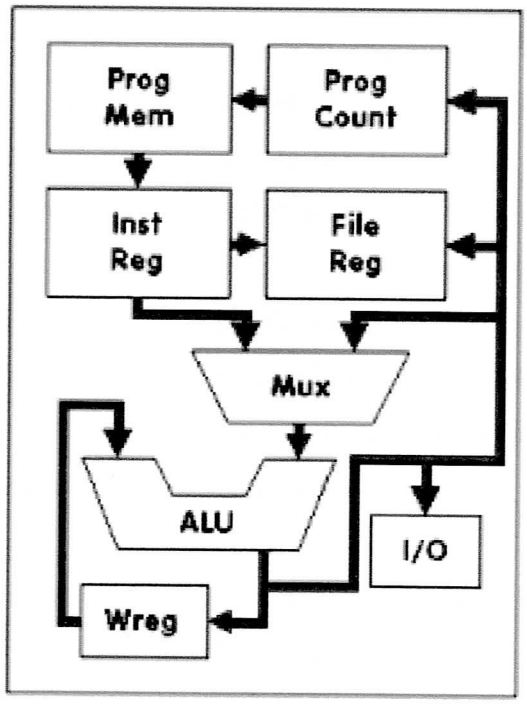

Figure 2.1: processor architecture

A memory capacity of 1G bytes = 1,024M bytes, 1M bytes = 1,024K bytes, 1K bytes = 1,024 bytes. 1K bytes is not equal to 1000 bytes. This is because the calculation is in binary (2 to the tenth power = 1,024).

2.1.2 Microcontroller

Microcontrollers must contain at least two primary components – random access memory (RAM), and an instruction set. RAM is a type of internal logic unit that stores information temporarily. RAM contents disappear when the power is turned off. While RAM is used to hold any kind of data, some RAM is specialized, referred to as registers. The instruction set is a list of all commands and their corresponding functions. During operation, the microcontroller will step through a program (the firmware). Each valid instruction set and the matching internal hardware that differentiate one microcontroller from another [9].

Most microcontrollers also contain read-only memory (ROM), programmable read-only memory (PROM), or erasable programmable read-only memory (EPROM). All of these memories are permanent where they retain what is programmed into them even during loss of power. They are used to store the firmware that tells the microcontroller how to operate. They are also used to store permanent lookup tables. Often these memories do not reside in the microcontroller; instead, they are contained in external ICs, and the instructions are fetched as the microcontroller runs. This enables quick and low-cost updates to the firmware by replacing the ROM. Where would a microcontroller be without some way of communicating with the outside world? This job is left to input/output (I/O) port pins. The number of I/O pins per controllers varies greatly, plus each I/O pin can be programmed as an input or output (or even switch during the running of a program). The load (current draw) that each pin can drive is usually low. If the output is expected to be a heavy load, then it is essential to use a driver chip or transistor buffer.

Most microcontrollers contain circuitry to generate the system clock. This square wave is the heartbeat of the microcontroller and all operations are synchronized to it. Obviously, it controls the speed at which the microcontroller functions. All that needed to complete the clock circuit would be the crystal or RC components. We can, therefore precisely select the operating speed critical to many applications. To summarize, a microcontroller contains (in one chip) two or more of the following elements in order of importance [10]: